

FOUR YEAR
REPORT TO THE
INTERNATIONAL
UNION OF
GEOLOGICAL
SCIENCES

2008-
2012

<http://www.cgi-iugs.org/>



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1. OVERALL OBJECTIVES, MISSION AND AIMS

An understanding of geology is crucial in protecting human life, health and assets, and sustaining our environment and resources. As in many areas of life today, information technology is having a dramatic impact on the way geological data and knowledge is being captured, processed and disseminated. The effective application of IT is the key to the future exploitation of geological knowledge for the benefit of society.

CGI aims to:

1. provide the means for transferring knowledge on geoscience information and systems
2. stimulate international dissemination of best practice in geoscience information
3. stimulate and support initiatives which are developing standards
4. establish and occupy an accepted position in the international geoscience information community and represent IUGS on geoscience information matters.

The CGI 4-year Action Plan for 2008 – 2012 can be summarised as follows:

- Catalyse alliances
- Stimulate progress and standard geological concepts
- Promote use of data exchange standards: evidence
- Facilitate outreach
- Role in coordination of regional initiatives

2. ROLE WITHIN IUGS SCIENCE POLICY

The CGI fills the role of the geoscience information body of the IUGS. It represents IUGS on geoscience information matters, provides the means for transferring knowledge on geoscience information and systems, assists international dissemination of best practice in geoscience information, stimulates and supports initiatives which are developing standards and its Council members hold several significant positions within the international geoscience information community.

3. CGI MEMBERSHIP



The number of geoscience information colleagues joining the CGI reached 243 members in 64 countries across the world!

4. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

Other than the substantial in-kind contribution of the geological organisations who pay the salaries and expenses of CGI Council and members, there is no additional support from other sources.

5. INTERACTION WITH OTHER INTERNATIONAL PROJECTS

The CGI is continuing to develop Geoscience ML (GeoSciML), a markup-up language allowing the digital exchange of geoscience information locally, continentally and globally. Both, the linked global OneGeology project and the European EC project OneGeology-Europe are using GeoSciML to make geological data interoperable and accessible via their web portals. The EC Directive INSPIRE in its geology theme is also working on a solution to use GeoSciML as part of their legal Implementing Rules. The CGI is hosting Earth Resource ML which is a mark-up language to exchange mineral and energy resources information. This is also planned to be used by the INSPIRE Directive within its mineral resources theme.

6. CHIEF ACCOMPLISHMENTS AND PRODUCTS

Annual Accomplishments

CGI - 2008 Activities

CGI Council for 2008 –2012 elected and endorsed by IUGS in Oslo

CGI sought nominations for its Council during 2008. By the deadline 10 nominations were received for the 12 places available. An additional Council Member has now been provisionally agreed.

The new Council is: Kristine Asch (Chairperson) – Germany, Ian Jackson (Secretary General) – UK, François Robida (Treasurer) – France, Gabriel Asato – Argentina, Peter Baumann – Germany, John Broome – Canada, Anna-Karren Nguno – Namibia, Bruce Simons – Australia, Dave Soller – USA, and Koji Wakita – Japan

Geoscience Information Symposium at the IGC in Oslo

Working in collaboration with the International Association of Mathematical Geology and the Geoscience Information Consortium, CGI played the key role in the organization and operation of the largest and most comprehensive ever Geoscience Information Symposium at the International Geological Congress in Oslo, Norway Aug 6-14. The Symposium included 3 plenary sessions and 14 technical sessions focused on the acquisition, management, use, and dissemination of geoscience data.

Highlights of the symposium included sub-sessions on portable systems for geological data collection in the field, geoscience data models and ontologies, geosciences information systems, metadata, and 3D modelling. All sessions were well attended reflecting the increasing importance of data management and informatics in the geosciences.

An additional session focussed the OneGeology and included presentation on the key role that CGI-endorsed standards play in the initiative. The GeoSciML geological data exchange Schema being developed by the CGI Interoperability Working Group is the primary data exchange mechanism being used by OneGeology. The important role that the CGI plays in coordination and endorsement of international geological data standards was referenced repeatedly during the IGC. This recognition is significant given that the CGI was only created at the previous IGC meeting in Florence.

This was the first time that all geoscience information abstracts at the IGC were coordinated. The multi-agency approach used for the Geoscience Information Symposium was deemed a success and plans are underway to follow the same approach again at the next IGC in 2012.

Interoperability



The work to define the semantic language and syntax that allow applications such as OneGeology to obtain geoscience data from multiple sources is a major CGI undertaking. During 2008, the CGI Interoperability Working Group has developed, tested, demonstrated, documented and released this mark-up language, GeoSciML v2.0.



The past year has been an extremely busy and productive year for the Interoperability Working Group. The September 2007 meeting in Melbourne, Australia defined the aims and work plan for development of GeoSciML. For 2008, this was to include a third round of testing the model through a number of ambitious use cases (Testbed 3), hold a workshop during the 33IGC and officially release GeoSciML v2.0, along with appropriate documentation. Through its various task groups the Interoperability Working Group achieved all the aims it set for 2008.

The Testbed Task Group held a short meeting in Orleans, France in February 2008, hosted by BRGM. The task group reviewed the progress of Testbed 3 and the implementation of the registry service by BRGM, as well as reviewing and refining the use cases in light of implementation issues.

The Geological Survey of Sweden hosted a second meeting of all task groups immediately prior to the 33IGC in Uppsala, Sweden (August). The twenty participants, representing eleven geological survey or research organisations, reviewed the Testbed 3 results, modifying GeoSciML where required, prepared for the 33IGC interoperability workshop and reported on progress in establishing draft multi-lingual vocabularies to allow exchange of common data content.

The Interoperability Working Group ran a workshop on Sunday 10 August from 09.00 to 14.30 during the 33IGC, with 47 attendees from 23 countries. The overwhelming majority were from Geological Survey Organisations, along with a few from universities and commercial organisations. The workshop provided an overview of GeoSciML and demonstrated Testbed 3. Seven organisations (Geoscience Australia, Geological Survey of Victoria, British Geological Survey, Geological Survey of Canada, Geological Survey of Sweden, BRGM, Italian Environment Protection and Technical Services Agency) successfully demonstrated GeoSciML web feature services. These included a web service hosted by BRGM delivering multi-lingual geoscience concepts.

Extensive discussion occurred during the workshop, principally involving clarification and information on aspects of GeoSciML and the web services. The participants were supportive of the principles of GeoSciML and interested in adopting it in their organisations. Some felt that the provision of a database schema based on GeoSciML would be a useful addition to the products available. The workshop participants also felt that the vocabularies and ontologies that the Interoperability Working Group developed for the purpose of Testbed3 data interchange, required wider consultation.

During the 33IGC, GeoSciML also received considerable exposure through the OneGeology release along with a number of presentations during the Information Symposia. During 2008, speakers presented GeoSciML at the GIC-22, GEON 2007, AGU Fall Meeting 2007, WALIS 2008 and AESC 2008 conferences.

In addition to the OneGeology take-up, the Canadian GroundWaterML initiative and Australian MineralOccurrences have extended GeoSciML into their domains. The European INSPIRE and US Geoscience Information Network are both looking at GeoSciML as a standard for geology data exchange. Software vendors such as ESRI, GeoModeller and SnowFlake are developing applications to allow direct import of GeoSciML formatted data.

Testing of the modifications to the model made during the Uppsala meeting (Testbed 3.1) is now completed. GeoSciML v2.0 will be officially released during the December 2008 AGU Fall Meeting in San Francisco, USA.

CGI is keen to see that its work on the Multilingual Thesaurus (MLT) and the Interoperability Working Group (IWG) are as closely linked as possible to progress a standard set of vocabularies that can provide the content for the GeoSciML geology exchange language. Improving this linkage will be an objective during 2009.

Earth and Space Science Summit

CGI was represented at an Earth & Space Science Informatics Summit in Rome 13-14th March 2008, convened as an Electronic Geophysical Year (eGY) activity. Participants represented the interests of more than 45 leading agencies and initiatives with an interest in geoinformatics. The Summit successfully establishing the basis for better mutual understanding and communication among the leaders of Earth & space science informatics programs worldwide, and confirmed a common resolve to work together cooperatively on data issues that demand a global approach. Participants noted the extraordinary growth of informatics in the Earth & space sciences, as well as elsewhere, to the extent that informatics is becoming the fourth pillar of the scientific method. At this formative stage, it is inevitable that special interest groups take individual approaches to establishing systems, interoperability protocols, data models, and so forth. Now is a critical time for establishing communication and coordination at the international level to seek uniformity in practices and standards, and reduce replication of effort.



What stood out as the main challenge to be addressed is the lack of infrastructure and governance to (i) cater for the professional needs of scientists and engineers engaged in informatics and (ii) provide an international framework for policy and action. The International Council for Science (ICSU) was recognised as the peak body best positioned to exert the necessary leadership. The Summit applauded the steps already taken by ICSU in this regard, and endorsed enthusiastically the recent recommendations of the ICSU's Strategic Committee for Information and Data. Informatics and data stewardship activities are generally a low priority for research scientists. Further, our present reward systems provide little incentive for change. Participants at the Summit regretted this situation as it fails to reflect the growing importance of informatics and the shift in work load from the user to the provider of data. It also compromises the availability and re-use of data. In addition to the above broad issues, the Summit dealt with a range of technical, community, marketing, and governance issues. The Summit concluded with a stronger sense of common purpose among the participants and a clearer view of the steps needed to establish a productive international framework for governance and leadership. A series of recommendations were developed under the groupings Governance, Professional Structure and Coordination, Technical and Systems, Marketing, Status and Approaches to take.

CGI - 2009 Activities

CGI and Interoperability

The Interoperability Working Group (IWG) of the CGI has continued to focus on the development and implementation of GeoSciML as an interchange format for geoscience data. GeoSciML v2 was released at the AGU Fall Meeting in San Francisco in December 2008. All materials associated with this release were made available for download from the CGI website – the UML model; the XML schema; examples of XML encoding using GeoSciML; full documentation of the model; and cookbooks to assist with mapping data to GeoSciML and the setting up of web services using GeoSciML.



Following the release of GeoSciML v2 work concentrated on its implementation, in particular through the OneGeology-Global and OneGeology-Europe initiatives, the Geoscience Information Network in the USA, and AuScope in Australia. The OneGeology-Europe project has as one of its specific objectives the acceleration of the development and deployment of GeoSciML which will be achieved through the use of GeoSciML to deliver a 1:1 million scale harmonised geological map of Europe. GeoSciML has been submitted to the Infrastructure for Spatial Information in Europe (INSPIRE) initiative as a candidate data specification for the geology theme, and it is hoped that it will form a significant component of the final INSPIRE geology data specification.

GeoSciML has also been used in the development of EarthResourceML (for minerals) in Australia and GroundWaterML in Canada, and close links have been maintained with these external initiatives. With European uptake on EarthResourceML, it is expected that the IWG will take over governance of this standard from the Australian geological surveys.

A GeoSciML workshop was held in Copenhagen in January 2009 at which GeoSciML was explained in detail to representatives of the Nordic geological surveys, and at which the application of GeoSciML to the specific problems of Nordic geology was discussed. This workshop was a success and could form the basis of similar workshops in other regions if a source of funding were available. Other dissemination activities included the presentation of papers on GeoSciML at the EGU General Assembly in Vienna in April.

Multilingual Thesaurus of Geosciences

The 9th Meeting of the Multi-lingual Thesaurus of Geosciences (CGI-MTG) took place in St Petersburg in Russia in July, 2009, where for the first time a link between the CGI Interoperability Working Group (CGIIWG) and the CGI-MTG was created. A number of vocabulary issues common to both groups were identified and discussed. It is planned for both groups to work together more closely, starting with an invitation only Science Language Workshop in 2010.

Much of the MTG work to date is based on the results of the Multhes work of COGEOINFO published in 1995. The lack of a hierarchy was the most prominent disadvantage of the Multhes and the biggest obstacle for a systematic update. The MTG WG developed new categories as a base for a systematic hierarchy and prepared guidelines for checking every term's specific requirements during the merging of the data.

Terms of the first and second hierarchical level were loaded into the data base as a basic set. While this basic set of terms is nearly complete for English and German it is partially translated into other languages (French, Spanish, Italian, Russian, Finnish: 90%) or translation has just begun (Polish,

Swedish: 10%). Any translation has to be done by language managers. Currently the Working Group Members are language managers as well.

Progress of the MTG depends on the ability of language managers to use thesaurus management tools. MTG WG members know most of the technical terms and guidelines for Thesaurus management. This will not be the case with new language managers. For that reason the MTG WG must work out guidelines for the Management tool as well as designing training courses for newly appointed language managers.

Any country that wants to add its language to the MTG has to appoint a language manager. Language managers must be appointed by competent national institutions, which in most cases will be the national Geological Survey or a comparable agency. CGI has yet to determine a procedure for appointments.

The Multilingual Thesaurus of Geosciences is only one tool for international trans-cultural, and translingual co-operation. It has to be integrated into a global strategy and harmonised with other projects.

CGI - 2010 Activities

Berlin: CGI and OneGeology-Europe International Workshop on Geoscience Language

The first International Geoscience Language Workshop took place in Berlin between 25 and 27 August 2010 under the patronage of the Federal Ministry of Economics and Technology. The workshop, believed to be the first to explore this area digital spatial geoscience taxonomy, was initiated by CGI and supported by the European Commission-funded OneGeology-Europe project.



It was organised by the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Germany. 66 participants from six continents took part. The Workshop was opened by a senior member of the Ministry, Diethard Mager, and the President of BGR, Hans-Joachim Kümpel.

Key presentations were made about the International Stratigraphic Chart, the OneGeology and OneGeology- Europe project, the influence of geosciences language on the implementation of the European Union INSPIRE Directive, and the challenges of building a European vocabulary. Other presentations tackled a variety of issues relating to geoscience language, vocabularies, harmonisation and technical implementation across the continents.

Progressing interoperability

During 2010 the 'top-level' objectives of the Interoperability Working Group of CGI were to:

- release GeoSciML v2.1 for OneGeology-Europe
- further develop the GeoSciML vocabularies and related services
- provide training on configuring GeoSciML Web Feature Services
- test the GeoSciML v3 Release Candidates (Testbed 4)
- develop a simple GIS view of GeoSciML (GeoSciML-TV)

The IWG and all task groups met in a joint session in September 2010 in Rome, hosted by APAT. The principal objectives of this meeting were to: review use cases for GeoSciML v3; agree changes of the data model for GeoSciML v3 based on initial Testbed 4 results; review progress with developing common vocabularies, including their management; review implementation architectures, including vocabulary services; agree and implement changes to the structure and composition of the working group; establish an EarthResourceML



Task Group to manage the mineral resources data model; identify mechanisms to increase the number of services delivering GeoSciML; and determine the relationship between GeoSciML and OGC working groups.

Interoperability and multilingual thesaurus working groups

At the CGI Council meeting in Berlin the Council discussed the work of these two groups, the benefits of their integration and merger. Council took a decision to merge the Multilingual Thesaurus of Geosciences Working Group with the Concept Definitions Task Group as single task group under the IWG.

This move integrates the two CGI teams that tackle geoscience language issues, the CGI vocabulary and the CGI thesaurus, initiate an holistic approach, avoid duplication of effort and overlap of thematic issues, maximize efficiencies, create structural simplicity and enhance communication; in summary substantial potential synergy can now be realised.

The decision to merge the groups was communicated to the three leaders in Berlin. Following this the groups will now be implementing their reorganisation and resolving membership issues.

CGI - 2011 Activities

"BIG DATA"

The year 2011 was characterized by broad recognition of the data tsunami - "Big Data" is the keyword, meaning: we have more (and more complex) data than we can reasonably cope with. At the same time, demand for evaluation is growing aggressively. Satellite imagery is one example: while in the past it was a challenge to get image files online, today "on-demand processing" is causing problems as users come with variable ad-hoc queries so that predefined product archives are no longer a solution. The buzzword is "Big Data Analytics". This challenge is not just a matter of resources. More and larger disks for storage will not resolve it. A large part of these new data comes are "raster data" - an effect of the sampling that takes place during data acquisition. A simple example of raster data are (2D) satellite images, which grow to substantial sizes when combined to seamless maps, as we use them today in services like GoogleMaps. Composing time series out of satellite images yields 3D x/y/t "data cubes", while seismic data occur as 3D x/y/z data. 4D data appear in climate and ocean simulation. In the life sciences we find 3D and 4D CAT scans of human brains, gene expression data, and many more raster data. Statistics per se deals with data cubes.

Scientific initiatives are emerging. The first-ever workshop solely dedicated to Array Databases ("array" is the IT term for "raster") was held in Spring 2011. The SciDB project has embarked on establishing scientific database support, using an approach very similar to SciQL, another project. A special case is rasdaman ("raster data manager") which has been developed over more than 15 years, and hence is the one system that can readily be deployed today.

The Open Geospatial Consortium (OGC) is particularly active in promoting open access standards, including on-demand processing. Standards like the Web Coverage Service (WCS) have been enabled in 2011 with flexible format encoding and coordinate system support. In this year's OGC Web Services (OWS) testbed activity strong emphasis has been put on aspects like geo processing and applications like aviation. It is felt in OGC that "Big Data" is an overarching theme for both science and industry. The EarthServer project (www.earthserver.eu) has set out to establish comprehensive, scalable support for Earth Science data. Topics include integrated data / metadata queries, cloud-based raster query optimization, and versatile client technology. Six Lighthouse Applications, each

one with 100+ TB, are being established. The extended rasdaman technology will allow for distributed queries among these archives.

CGI Supported Projects and Organisations

Geoscience InfoRmation in AFrica Network (GIRAF)



The most significant CGI activity in Africa in 2009 was the Geoscience InfoRmation in AFrica workshop (GIRAF2009). Between 16 - 20 March 2009, 97 participants from 22 African nations, plus four European countries and representatives from UNESCO, ICSU and IUGS-CGI participated in the event at the Namibian Geological Survey (GSN) at the Namibian Ministry for Mines and Energy in Windhoek.

The Federal Institute for Geosciences and Natural Resources (BGR) together with the CGI and the GSN had made substantial progress in organizing the workshop in 2008 and spring 2009. The organizers were: Kristine Asch (BGR, CGI) and Gabi Schneider (GSN), supported by Anna Nguno, (GSN, CGI), Peter Schütte (BGR) and a team from both GSN and CGI.

The workshop was mainly financed by the German Federal Ministry for Economic Cooperation and Development (BMZ), with contributions from the company Southern Mapping, South Africa and the CGI). The participants came to Namibia to discuss one of the most topical issues in the geological domain – geosciences information and informatics. A prime objective was to set up a pan-African network for exchanging knowledge about geosciences

information.



GIRAF 2009 builds on the results of a preparatory workshop organised by the CGI and funded by the IUGS, which was held in June 2006 in Maputo at the 21st Colloquium on African Geology – CAG21. This preparatory workshop concentrated on identifying general problems and needs of African geological institutions in discussion with representatives of African geological surveys, universities,

private companies and non-governmental organisations. The GIRAF 2009 workshop used the results of this discussion to plan and design its programme.

Aims and objectives

In detail the aims of the GIRAF2009 workshop were:

- to bring together relevant African authorities, national experts and stakeholders in geosciences information;
- to initiate the building of a pan-African geoscience information knowledge network to exchange and share geoscience information knowledge and best practice;
- to integrate the authorities, national experts and experts across Africa into global geoinformation initiatives;
- to develop a strategic plan for Africa's future in geoscience information;
- to make Africa a more active part of the international geoscience information community.

The Programme

The programme for the GIRAF 2009 workshop was designed to explore each of these aspects to improve the way geoscience information contributes to improve the health and prosperity of the people in Africa.

After welcome speeches from the Namibian Minister of Mines and the German Ambassador for Namibia, the workshop commenced with a series of keynote presentations, including Professor Sospeter Muhongo (ICSU) on the status of and the need for a network on geoscience Information in Africa, Dr. Felix Toteu (CRGM, Cameroon) on the reasons for a Geoscience Workshop in Africa, and Sarah Gaines (UNESCO) on UNESCO Earth Science Initiative in Africa. The aim of the week, however, was to better understand the reality of the status of geoscience information management, delivery, and systems from the perspective of the practitioners and projects across Africa. To do that the GIRAF workshop adopted three different approaches:

1. projects and initiatives in the national geological survey organisations across Africa were presented by the participants and their presentations discussed;
2. two sets of breakout sessions were held, allowing more detailed discussion of specific issues;
3. on each of three days, a novel "Question of the day" was posed, where feedback from individuals was sought on three pointed questions.

These exercises ensured that every attendee was able to contribute his/her views and experiences. The results were intense discussion of the issues which the participants felt were key to developing and improving the way geoscience information could be managed and delivered in Africa. The very tangible outcome of a hardworking but fruitful week was the unanimous endorsement of a series of practical recommendations – the GIRAF Strategy and Agreement.

The participants at GIRAF 2009 agreed 15 points and milestones (see www.giraf-network.org) to improve the development of geological Information knowledge, cooperation and projects from Africans for Africa and to widen the 'GIRAF community'.

One of the decisions was to hold a second follow-up workshop in 2011 with the main aims to:

- Continue the building of a pan-African geoscience information knowledge network to exchange and share geosciences information knowledge and best practice
- To review the realization of the GIRAF 15-point-GIRAF agreement set up at the First workshop and signed by all 97 participants

- Gather up-to-date feedback on the actual situation of geoscience information status and progress in Africa
- And in long-term planning improve the way geoscience information contributes to improve the health and prosperity of the people in Africa.

This and other GIRAF issues were presented and discussed in the Africa Session of the Conference of the European Geosciences Union (EGU 2010).

GIRAF - 2011

In 2011 two major African events were delivered first, the common GIRAF-AEGOS-OneGeology workshop at the CAG 23 meeting in Johannesburg in January, and second, the 2nd GIRAF workshop (Geoscience InfoRmation in Africa) in December 2011 in Dar es Salaam.



GIRAF-AEGOS-OneGeology Workshop: Johannesburg on 12 January 2011, at the CAG 23 meeting.

This was an excellent opportunity to exchange information about the status of all 3 initiatives/projects, to investigate common goals, opportunities for cooperation and plan further milestones and proposals.

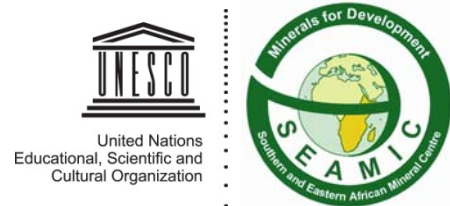
The workshop was attended by around 30 participants and participants were presented with the details of the GIRAF, AEGOS and OneGeology projects and had the opportunity to discuss differences, complementarities, gaps and overlaps.

The Commission for the Geological Map of the World expressed interest to use the GIRAF network to help create a new Geological Map of Africa at a 1 : 5 million scale. The possibility of short courses, e.g. on GeoSciML and/or digital mapping were discussed.

The Workshop helped the planning of the next GIRAF workshop which took place in Dar es Salaam and was hosted by SEAMIC (The Southern and Eastern African Mineral Centre).

GIRAF 2011 Workshop: Dar es Salaam, 5 - 9 December 2011.

From 5.- 9. December the second workshop for Geoscience Information in Africa – GIRAF 2011 took place. It was organized and financially supported by the International Union for Geosciences/CGI and UNESCO, and hosted by the Southern and Eastern African Mineral Centre (SEAMIC).



Aims of the event were to strengthen the building of the pan-African GIRAF network (GIRAF = Geoscience Information in Africa), to gather and review feedback on the actual situation of geoscience information and progress in Africa, to connect African experts working on geoscience information not only within the countries but also across political boundaries, to review the progress of building the GIRAF network as set up at the 1st workshop in Namibia 2009, and in the long run improve the way geoscience information contributes to improve the health and prosperity of the people in Africa.



The programme comprised keynote speeches from representatives of the UNESCO, SEAMIC, OAGS and CGI and thematic presentations by the workshop participants in particular on geoscience information projects and initiatives in the fields of geohazard management and mineral resources. Break-out groups discussed burning issues and a special AEGOS session will be organized, and two short courses on both GeoSciML and “The Preparation of spatial data for the publication through the Internet” (i.e. web services) will be offered.

www.giraf-network.org

ONEGEOLOGY

OneGeology is an initiative in which CGI and its members play a significant part. Only two and a half years after the concept had been introduced OneGeology and its portal was formally launched at the 33rd IGC.



At the beginning of the 33rd IGC in Oslo in 2008 81 nations were participating in OneGeology. Of the 81 nations, 30 were serving data to the OneGeology portal by 6 August 2008 – this equated to almost 100 map datasets from national sources and also, importantly, from the prime international scientific body in global geoscience mapping, the CGMW.



Currently 117 nations are participating in OneGeology and over 50 of these are serving 252 datasets to the OneGeology web portal (<http://portal.onegeology.org/>).

The technology to achieve OneGeology is not complex, but it in terms of the scale of the deployment it is truly world leading. A basic principle of OneGeology is that it must be open to all geological surveys to participate, regardless of development status and the project has devised protocols and systems to ensure this.

OneGeology is thus open to those who currently possess only traditional paper geological maps, and to those operating sophisticated web mapping systems. The end-user does not require specialist software, only access to the Internet via a web browser. In this first phase OneGeology is delivering digital geological map data from participating nations using Web Map Services (WMS). This is a distributed, dynamic and sustainable model, which unlike Google Earth leaves the data where it is best looked after and updated; that is with the provider nations. Each survey either registers its web service with the OneGeology Portal or works with a partner survey (a “buddy”) to serve that data. OneGeology technology is compliant with the international Open Geospatial Consortium (OGC) Web Map Service standard. Geological surveys may use a variety of software (e.g. MapServer) to serve their data. The Portal displays the map data served by each country and provides users with the ability to zoom, pan, switch map data on and off, change its opacity and transfer it to Google Earth.

Technically, OneGeology also continues to progress well in close collaboration with the CGI Interoperability Working Group and we are seeing more nations move from Web Map Services (WMS) to Web Feature Services (WFS) which offer significantly more functionality for the user.

A very successful first meeting of the OneGeology global Steering Group was held in Paris in April 2009.

The Steering Group also held a telephone conference in November 2009 and endorsed a very significant step in OneGeology’s governance and sustainability – approving its progress towards incorporation. Earlier in the year the Operational Management Group met in Buenos Aires, in a meeting timed to coincide with the CGI Council meeting and the South American seminar. A wide

ranging series of constructive discussions took place on progress to date and next steps and we were very pleased to have the President of IUGS attend the whole meeting.

The next Steering Group and Operational Management Group took place in April 2010 in New Zealand and in July 2010 in Germany, respectively.

Steering Group members are:

- Dr Hirokazu Kato (Director General Geological Survey of Japan representing CCOP)
- Dr Alex Malahoff (Chief Executive GNS Science New Zealand)
- Prof Alberto Riccardi (President IUGS)
- Dr Suzette Kimball (Acting Associate Director for Geology USGS)
- Dr Marko Komac (Director Slovenian Geological Survey)
- Dr Gabi Schneider (Director Geological Survey Namibia)
- Robert Missotten (Chief Global Earth Observation Section UNESCO)
- Dr Manuel Pubellier (Secretary General CGMW)



OneGeology is synergistically using the vehicle of creating a tangible geological map to accelerate progress of a global geosciences data model and interchange standard (GeoSciML). Most importantly the project is transferring know-how to those who wish to deliver spatial data on the Internet and especially developing countries. To do this several training courses were held in 2010. Reducing the length and expense of the learning curve allows developing nations to serve geological maps and data that will attract interest and investment.

A major objective of OneGeology in 2010 has been to make progress towards incorporated status and its Steering Group are currently considering the final draft of the Articles of Association.

OneGeology has four basic objectives and progress is reported against these below. Two significant additional tasks in the 2011 period were: taking forward the proposal to incorporate OneGeology and development of the Accreditation Scheme for web services.

Improve the accessibility of geological map data

Despite considerable efforts we have not managed to significantly increase the number of nations participating in the last year (2011). The number is now 117 countries. We have, however, increased the number of state/provincial surveys participating and serving data. Over 50 countries and 6 states/provinces are now serving data. There are currently 229 WMS and 23 WFS data layers being served through the portal. The data has come from 57 data providers and is being served by 46 service providers. There are one or more layers for 51 nations, 20 continental or other large world regions and 8 smaller sub-national regions. We have had official confirmation that data for the Russian Federation will be served in the next few weeks. This would be a major step covering a large part of the Earth's surface and we very much look forward to it. We have strengthened our linkages

with GeoParks and also held a meeting with Map Action the international humanitarian organisation which provides responsive mapping capability in disaster zones (eg Pakistan and Haiti).

Exchange know-how and skills so that all nations can participate

The WMS Cookbook (technical manual) has been updated several times and is available for download on the OneGeology website. A new WFS cookbook will be produced over the coming year (the release depends on software developments to support the new WFS v2.0.0 standard which is also an ISO standard). In 2011 we ran a OneGeology workshop at the 23rd Colloquium of African Geology in January 2011, in Johannesburg in association with the GIRAF network and AEGOS projects. The OneGeology-Europe project significantly improved the competence of EU geological surveys in data standards, access and a whole range of digital map capabilities. All of this know-how is now available through its associated documentation to OneGeology global participants. Similarly the GIN project in the USA is sharing methods and understanding in providing data access via web systems. The OneGeology web site provides general and specific technical guidance and queries are answered via email and phone calls. The buddy system (where one nation provides assistance to help another nation serve data) is being used by 15 nations. OneGeology has excellent links with the YES Network (Young Earth Scientists) and they receive our newsletters and documentation. The ESRI grant offer has been taken up by a number of OneGeology participants and is improving capability in GIS and digital mapping.

Accelerate interoperability in the geosciences and the take up of a new “standard” (GeoSciML)

As geological surveys move to WFS (Web Feature Services) they are fully incorporating GeoSciML standards. Currently there are 23 WFS services, however we are not pressing for new WFS services until the final release of GeoSciML v3 and the release of a new WFS cookbook to cover how to set up GeoSciML v3 services. OneGeology-Europe took forward and deployed the geological concept definitions and vocabularies developed by the IUGS-CGI GeoSciML team. This helps the geological sciences move on from interoperability to semantic harmonisation; a pre-requisite of full (geometric) harmonisation. OneGeology is an active contributor to GEO/GEOSS.

Use the global profile of OneGeology to increase awareness of the project and the relevance of the geosciences

OneGeology has maintained its high profile. The website is dynamic and is updated at least weekly. Several editions of the newsletter have been produced and is disseminated to over 2000 contacts worldwide. In the last 12 months over 40 presentations have been given by OneGeology team members and a number of articles and papers have also been generated. The audiences for these presentations range from geological surveys, to international conferences and workshops on geoscience, informatics and spatial data infrastructures. The European Environment Agency have agreed an MoU with EuroGeoSurveys to use OneGeology (European) data in their work programmes. OneGeology participants and the secretariat have been improving the content of our 'OneGeology4Kids' pages and these have now been translated into several languages. They are a fun introduction to geology linked to OneGeology maps and aimed at children under 10 years old.

www.onegeology.org

OneGeology - Europe

Major advance in Europe!

OneGeology-Europe, a 20 nation project which sits within the OneGeology global framework and which is being funded by the European Commission (€3.25 over two years), under its *eContentplus* programme, accelerated progress on data models, a set of rock terms and ontologies and also the serving of high resolution geological data.



OneGeology-Europe has built a system to serve live geological map data from the computers in each nation and make it available on the internet to anyone with a web browser. A team of geologists and users of geological information from 21 European geological surveys have delivered the first ever multilingual internet geological map of Europe. To do this the project team developed a state-of-the-art way to share digital geological map data (making it 'interoperable') and also tackled the enormous challenge of harmonising decades of scientific data from 21 different Member States. The team also overcame one of the biggest barriers to data access — the legal and copyright issues — all the participating nations have agreed a simple single one click licence that makes the data available for free, for any use.

The project has taken cutting edge internet mapping technology and standards and applied it to the distributed geological data of a whole continent. It is the first example of a multi-national deployment of environmental data of this scale. Making available geological data like this opens up a host of possibilities — some of which are already in train — including geological Apps for mobile phones.

OneGeology-Europe had 28 partners from 21 European nations. 20 of these partners are national geological surveys, 7 are users of geological information and one partner organisation is expert in the legal aspects of digital data. One of the prime aims of OneGeology-Europe has been to test and advance the implementation of a new European Directive — INSPIRE — which was brought into force in May 2009. This EC Directive requires each Member State to make available and share Public Sector spatial environmental data to enable better delivery of policy and actions across Europe.

OneGeology-Europe is of course contributing to OneGeology — the overarching global initiative set up two years earlier in 2006 (see www.onegeology.org).

Open Geospatial Consortium (OGC)

CGI continues to strengthen its connections with the Open GeoSpatial Consortium. OGC (www.opengeospatial.org) is a non-profit, international, voluntary consensus standards organization that is leading the development of standards for geospatial and location based services. OGC is an international consortium of



365 companies, government agencies, and universities participating in a consensus process to develop publicly available interface specifications. OGC specifications support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT. The specifications empower technology developers to make complex spatial information and services accessible and useful with all kinds of applications.

To this end, OGC closely cooperates with relevant neighbored bodies, such as ISO (in particular TC 211), OASISOpen, and W3C. ISO specifications form the basis for OGC's specifications; for example, ISO 19123 has been adopted as Abstract Specification Topic 6 in OGC. Conversely, ISO issues OGC standards in parallel. Since 2007, a liaison also exists with CGI to foster mutual information as well as harmonization of specifications.

Given the complexity of geo services, OGC does not aim at a single, monolithic standard, but rather issues a family of modular specifications which are initiated on demand and through active participation. All specifications are based on the unified architecture laid down in OWS Common and the Abstract Specifications.

While OGC historically has started with a GIS perspective in mind, today "geo service" is understood as servicing any kind of location-based information over the Internet. As such, there are tight connections into domains like atmosphere and ocean modeling, security (such as air traffic control).

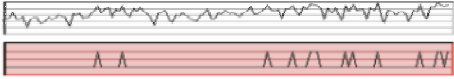
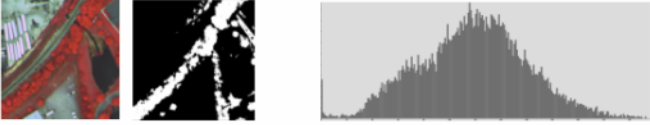
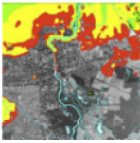
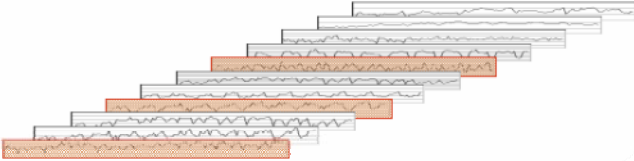
It is safe to state that OGC is the most relevant geo service standardization body today, and actually driving the field. For example, the European INSPIRE initiative which defines a regulatory framework for geo services offered by governmental agencies within the European Union is completely based on OGC standards. The steadily growing number of OGC members as well as OGC-compliant products and operational services hints that OGC will continue to play an important role in open, interoperable geo services.

In the spirit of cooperation for technological interoperability a mutual acknowledgement of specifications among CGI/IUGS and OGC is advantageous and will send an encouraging signal to the relevant user communities.

In 2009, high emphasis has been put, among others, on advancing interface standards for observational data. On the one hand, the Sensor Web Enablement (SWE) standards suite addresses sensor data collection and processing in an application driven manner. On the other hand, the Web Coverage Service (WCS) standards suite addresses spacetime varying phenomena, such as 2-D satellite imagery, 3-D x/y/t image time series and x/y/z geophysical data – where OGC meets with CGI –, and 4-D climate and ocean data, to name but a few. A CGI Council member serves on the Board of OGC and another Council member is co-chair of the coverage-relevant working groups in OGC, editor of many of the coverage standards documents, and is the appointed liaison person to achieve and maintain harmonization in the field of coverage standards.

2009 has seen significant advances in this field. Beginning 2009, the new OGC Web Coverage Processing Service (WCPS) has been published, which extends WCS with a query language on multidimensional raster coverages; hence, WCPS has been dubbed “SQL for coverages”.

Over summer and fall, the WCS specification itself has been revamped, leading to WCS 2.0 which has been proposed for voting by the OGC members in December 2009. WCS 2.0 will greatly enhance harmonized access to coverages, relying on GML 3.2.1; in future, coverages can be passed on between different service types, such as SOS, WPS, and WCS. The WCS specification itself is modularized so that application profiles can be built for different domains, such as SCADA (sensory), earth observation, earth system modelling, and geology. Extending WCS with functionality, but also with relevant data formats, will be a main topic in 2010.

- Time series 
- Image processing 
- Summary data
 - current value is 82205;
 - average over all values up to now currently is 7461.7692307692305.
- Sensor fusion & pattern mining  

CGI has established a very close connection and strong relationship with the global spatial standards body OGC in 2010. There have been many strategic and technical discussions between members of the organisations.

We are considering the different options to reinforce these connections between the two organisations in order to give a better visibility to the CGI standards (GeoSciML and maybe ERML), and to take advantage of the expertise of OGC for some of our technical challenges. The next step may be the signature of a MOU, and the creation of a joint Working Group.

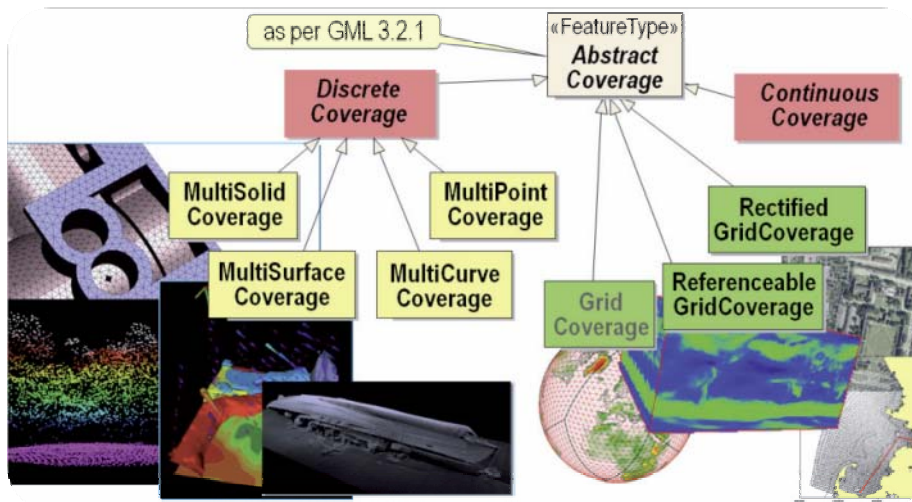
Web Coverage Service (WCS) 2.0

The OGC Web Coverage Service (WCS) 2.0 standard has been officially adopted by OGC in August 2010. WCS 2.0 defines a standard interface and operations that enable interoperable access to geospatial coverages, i.e.: space/time-varying phenomena such as sensor data, satellite imagery, digital elevation models, and climate/ ocean data. An important aspect of the WCS standard is that it allows access and retrieval of raw, unprocessed data, which is more and more required by processing and rendering tools.

The WCS 2.0 standard has several significant enhancements over previous versions, following intensive hearings of many stakeholder communities. WCS 2.0 is harmonized with the Geography Markup Language (GML) coverage model, leading to increased interoperability across OGC

standards. Further, WCS 2.0 supports all GML and ISO coverage types, therefore extending WCS from pure raster data to point clouds, curvilinear grids, general meshes, and more coverage types. Additionally, WCS 2.0 is highly modular and follows the OGC's new Modular Specification Policy, which describes a design pattern that makes standards easier to understand and implement. The WCS 2.0 standard is available for free download at

<http://www.opengeospatial.org/standards/wcs>



Further, a NetCDF Working Group has been established in OGC with the goal of making NetCDF an OGC standard. A similar step is under way with GeoSciML. Among the benefits expected is an intensified harmonization of these specifications with the relevant OGC standards, such as WCS.

Altogether, core specifications for geology in particular and the Earth Sciences in general have made important steps towards increased interoperability and, ultimately, enable a new level of service quality for Earth Science data access and retrieval.

CODATA

CODATA - 2008

The CGI provides the IUGS with an IUGS voting delegate at the bi-annual “Committee on Data for Science and Technology”, or CODATA meeting. (<http://www.codata.org>). CODATA is an interdisciplinary scientific committee established by the ICSU to improve the quality, reliability, management and accessibility of data of importance to the fields of science and technology. The 2008 CODATA conference was a medium-sized event (~500 participants, 30 countries) that provided an opportunity to share information on management, exchange, and delivery of scientific information, data, and knowledge across scientific discipline boundaries. Sessions tend to be high-level and focused on policy and planning rather than detailed technical solutions. Typical sessions discussed subjects such as; data archiving, quality control, publication, interoperability, metadata, knowledge discovery, visualization, and communications. There were complete sessions addressing approaches from the domains of material science, earth science, biology, environment, biodiversity and remote sensing. John Broome (Canada) is the IUGS/CGI delegate. In addition to attending the CODATA General Assembly, Mr. Broome made a presentation on OneGeology/GeoSciML and data stewardship.



Key Results of the 2008 CODATA Conference:

- The International Union of Geophysics and Geodesy has recently taken steps to create a “Data Commission” to address many of the issues that resulted in the IUGS creating the CGI. Opportunities for synergy between the CGI and the new IUGG Commission were discussed and plans are in place to establish cross representation on the Councils of the two commissions to ensure synergy between the 2 groups.
- A conference session and General assembly item focussed on the ICSU Strategic Committee on Information and Data (SCID) Report. A special consultation session was held to discuss the recommendation in the SCID Report.
- The OneGeology/GeoSciML presentation generated considerable interest in the CODATA community. Of particular interest was the extensible nature of the standard and possible opportunities to use it for other data sets. A paper on the subject was invited by the Data Science Journal.
- CODATA strongly supported the planned CODATA-endorsed GIRAF conference in Namibia in March 2009 as an initiative that will address the global “digital Divide”. The CODATA General Assembly requested that a CODATA presentation be included in the agenda of GIRAF.

The evolution and acceptance of the GeoSciML standards and its demonstration through the OneGeology initiative has led to the IUGS and CGI being recognized in the CODATA community as union leaders in data management leadership.

The evolution and acceptance of the GeoSciML standards and its demonstration through the OneGeology initiative has generated considerable interest in the CODATA community. Of particular interest was the extensible nature of the standard and possible opportunities to use it for other data sets. For example, usage of the GroundwaterML data exchange standard established by the groundwater community on the GeoSciML foundation continues to grow. In addition, the IUGG is proceeding with the establishment of a “data commission” similar to the CGI.

At the 29th ICSU General Assembly in 2009, the Executive Board, decided to establish an ad hoc Strategic Coordinating Committee for Information and Data (SCCID). This new Committee will provide ICSU with broad expertise and advice on strategic direction in the area of scientific data and information management and dissemination policy and advice on the data needs and possible solutions for existing and new ICSU programs and other international initiatives. In particular, SCCID will advise ICSU on future directions for CODATA and the World Data System (WDS). CGI member John Broome was invited to become a member of the new committee. At the first SCCID meeting in October 2009, a review of current international best practice in research data management resulted in the IUGS CGI approach being identified as best practice and targeted for further study and broader adoption.

In addition, the IUGG has now also created a 'data commission' modelled on the CGI. At the 2010 CODATA conference, a technical session focused on ICSU Union data activities with 4 unions, including CGI, presenting their approaches to data leadership and coordination. Associated discussions have resulted in an ICSU grant proposal being prepared to build upon best practices identified at the session and share this knowledge within the ICSU community. IUGS will be asked to be a supporting organization on the proposal.

At the 2010 General Assembly, Mr Broome was elected as a member of the CODATA Executive which will facilitate communication between CGI and CODATA and continues to represent CGI/IUGS on the ad hoc ICSU Strategic Coordinating Committee for Information and Data (SCCID). This Committee provides ICSU with broad expertise and advice on strategic direction in the area of scientific data and information management and dissemination policy including advising ICSU on future directions for CODATA and the World Data System (WDS). SCCID is currently working on interim recommendation to be presented to ICSU in Spring 2011.

At the 2010 CODATA conference, a technical session focused on ICSU Union data activities with 4 unions, including CGI, presenting their approaches to data leadership and coordination. Associated discussions resulted in the decision to pursue ICSU funding through a grant proposal to build upon best practices identified at the session and share this knowledge within the ICSU community. A proposal was submitted entitled "*Harmonization of Scientific Data Standards within the ICSU Community*". IUGS was one of the endorsing unions for the proposal but unfortunately the proposal was not funded. Some of the proposed work will proceed but at a much slower rate. At the 2010 General Assembly, John Broome was elected as a member of the CODATA Executive which will facilitate communication between CGI and CODATA; he also represented CGI/IUGS on an *ad hoc* ICSU Strategic Coordinating Committee for Information and Data (SCCID), which delivered its final report to ICSU in 2011. This report provides ICSU with recommendations on strategic direction in the area of scientific data and information management including on future directions for CODATA and the World Data System (WDS).

CGI Across the Globe

CGI in Asia

Asia - 2008

The Geological Survey of Japan (GSJ) and the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) organized two major working groups in the early 2008. These are the CCOP GEOGrid and the OneGeology-CCOP working groups. The activities of the Asian regional working group are based on the activities of these two groups. The CCOP GEOGrid working group held its first meeting in Tokyo and Tsukuba, Japan from January 21 to 24, 2008. The meeting was attended by representatives of the CCOP-Member countries such as Cambodia, China, Indonesia, Japan, Korea, Malaysia, Philippines, Thailand and Vietnam. This was followed by the first meeting of OneGeology-CCOP working group on January 25, 2008.

Mr. Tim Duffy of the British Geological Survey (BGS) was invited as speaker at the two working group meetings. He and GSJ staff gave lectures about GeoSciML and OneGeology projects and other topics related to Open GIS. Participants at the meetings and lectures learned about the importance of standardization of geoinformation and interoperability, as prerequisites for cheap and efficient methods of processing and distribution of geoinformation through the World Wide Web.

Before the 33rd IGC in Oslo, GSJ and CCOP helped the geological surveys of the East and Southeast Asian countries setup Web Mapping Servers (WMS) for their 1:1,000,000 scale digital geologic maps for registration into the OneGeology portal. The WMSs of the geologic maps of Japan, Korea, Philippines, Thailand and Indonesia were successfully setup and registered to the OneGeology portal. GSJ also setup a WMS client for viewing of the said online maps. The URL of the client is http://geodata1.geogrid.org/client_trial2/index.html.

The second meetings of the CCOP GEOGrid and OneGeology-CCOP working groups are tentatively set for January 2009 in Bangkok, Thailand. The OneGeology GeoSciML version will be introduced to the members of the two working groups. The dissemination of the GeoSciML technology to the Asian countries will be discussed during the meetings. These will be the first activities of the CGI Asian Regional Working Group in 2009.

Asia - 2009

The major Activities of the CGI East and Southeast Asia Regional Group in 2009 included the 3rd CCOP-GEO Grid and Asian Geoinformation Infrastructure workshop held in Bangkok, Thailand from 17-18 March 2009. This was followed by the ASEAN + 3 Geoinformation Seminar held in Shanghai, China from 6-7 April 2009. The International Symposium on Geoinformatics was held in Tokyo, Japan on 25 May 2009. The activity was organized by GSJ, Japan Society of Geoinformatics and the Geoscience Information Consortium (GIC). Another major activity was the CCOP annual meeting held in Vung Tau, Vietnam from 19-25 October 2009. The meeting consisted of the 46th Annual Session from 19-23 October and the 53rd Steering Committee meeting from 24-25 October 2009. GSJ also participated in the GeoSciML and OneGeology technical working group meetings held in Quebec City, Canada from 21-25 September 2009. Another important event was the setting up of a small committee for the CGI/IUGS, under the IUGS subcommittee of the Earth and Planet Science Committee, by the Science Council of Japan on 24 June 2009.



The Web portal for the Asian OneGeology site was launched in March 2009. The site is called East Asia Open Spatial (<http://geodata1.geogrid.org/EastAsiaSpatial/index.html>), showing the region's geological map WMSs that are compliant to OneGeology Level 1 specification. New organizations and countries in the region expressed their intention to join the OneGeology project. These include Japan's National Institute of Polar Research (NIPR) and the geological surveys of Mongolia and Pakistan.

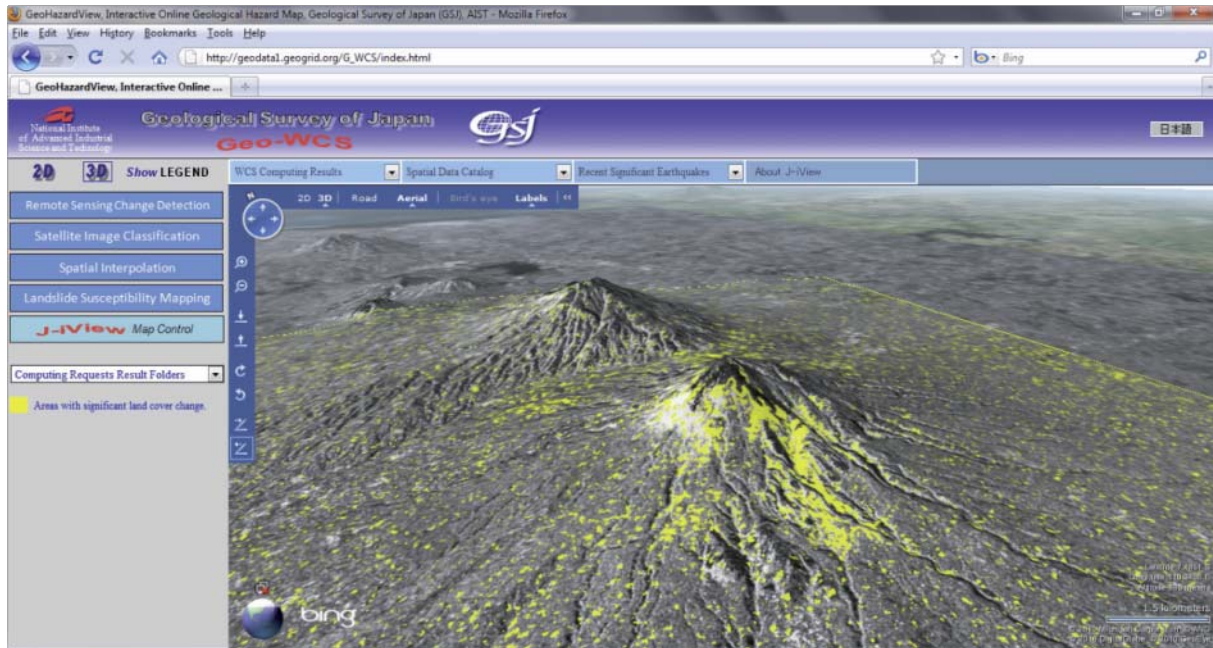
Asia - 2010

The Asian Working Group of CGI held an outreach workshop for the Asian geosciences community in Thailand in 2011, in cooperation with CCOP. The workshop was endorsed by the CCOP annual and steering committee meetings in Manado, Indonesia in October 2010.

The Japanese Government decided to hold a training course for ASEAN Mineral Database from 2011 to 2013 to disseminate CGI standards such as GeoSciML and EarthResourceML.

The Geological Survey of Japan (GSJ) officially launched the open source based online viewer of Japan's seamless geological maps on Feb. 18, 2010. The viewer is named J-iView. J-iView is an online system used for the management, storage and delivery of geographically referenced information. The Web Mapping Service (WMS) of the 1:1 M Geological Map of Malaysia was successfully registered to the OneGeology portal on June 14, 2010. The WMS service is hosted by the GSJ.

A new project support by the China Geological Survey (CGS) was set up in 2010. The main objective of this project is to study the CGI standards and its relationship with the IGMA (1:5M International Geological Map of Asia, CGMW). This project also got support from the ESRI China. CGS invites some young GIS experts to join this project.



GSJ and CGS actively participated in the Group on Earth Observations (GEO) 2010 meeting (GEOVII) in Beijing in November 2010. GSJ just developed a new Web Computing Service (WCS) named Geo-WCS. The first service available is the land cover change detection system using ASTER and ALOS images. Land cover change detection is very important for the rapid identification of areas affected by natural disasters. The URL of the site is http://geodata1.geogrid.org/G_WCS/index.html.

Asia - 2011

The CGI related activities in the ASEAN region had mostly been on the outreach workshops to train ASEAN member countries on the setting up of Web Map Services (WMS), development of spatial databases and the dissemination of CGI standards such as GeoSciML and EarthResourceML. The workshops were conducted through the ASEAN Mineral Resources Database training courses which are funded by the Japanese government from 2011 to 2013.

The first workshop was conducted in February 2011 in Tsukuba and Tokyo, Japan. The training focused on the introduction of OGC standards and data preparation for Web Mapping Service (WMS). The second workshop was conducted in June, 2011 in Bali, Indonesia. The workshop focused on the setting up of WMS servers using the ASEAN member countries' data and the setting up of PostGIS database. The training also includes writing of PHP scripts to automatically upload data to the PostGIS database and the generation of mapfiles for WMS servers. The CGI outreach workshop from November 15 to 16 in Bangkok, Thailand was cancelled and moved to February 2012 because of the flooding in Bangkok city.

The WMS servers of the maps of the ASEAN region which are registered to OneGeology are moved to the GeoGRID clusters. Because of this, the ASEAN OneGeology WMSs are now hosted redundantly in several GeoGrid clusters of servers making the services very fast. The new system is now capable of handling high volume of requests. The WMS of the Geological Map of Papua New Guinea is now ready for OneGeology registration. The WMS would be submitted to the OneGeology secretariat after the official approval from the Papua New Guinea government is received. The WMS is hosted by GSJ server.

The fifth Workshop on 1:5,000,000 International Geological Map of Asia – Geological Evolution of Asia was conducted in Beijing, China on 25-29th April, 2011. The workshop was supported by China Geological Survey, Chinese Academy of Geological Sciences and CGMW Sub-commission for South and East Asia. In this workshop, final draft of IGMA 5000 was discussed. Based on this discussion, work on the final edition of digital database of IGMA5000, which is one of the CGI related products in the Asian Working Group has progressed. The main products of 2011 are:

- *J-iView* - an open source based online viewer of Japan's WMS. It is used for the management, storage and delivery of geographically referenced information. J-iView would now be used for viewing the OneGeology registered maps of the East Asian region.
- *J-WPS*: This is the web computing service for processing satellite image of GSJ. The developed system is composed of 3 modules which are the Web Processing Service (WPS), Web Map Service (WMS) and the user interface provided by J-iView. The first service available is the change detection system of satellite images to automatically map areas affected by natural disasters. Input data are provided by WMS servers and generated maps are displayed by J-iView as WMS.
- *J-MapMobile*: smartphone app for viewing WMS based maps in iPhones. The app is presently submitted for inclusion to Apple's App Store. The digital compilation of International Geological Map of Asia at a scale of 1:5,000,000 is almost ready as a final version.

Main Problems Encountered in Asia

The chief problems encountered in 2011 related to natural disasters that severely damaged the information technology infrastructure in Japan. The strong earthquake that struck Japan in March 2011 damaged most of GSJ's servers including the machines hosting the OneGeology WMSs and related online databases. J-iView and J-WPS are still awaiting open servers for them to be hosted on. For the moment, they are just accessible within AIST and GSJ. Fortunately, all OneGeology WMS are now back online. Another natural calamity that affected our activity is the flooding in Bangkok, Thailand. This caused the cancellation of the CGI Outreach Workshop scheduled from November 15 to 16, 2011.

CGI in Africa

Africa 2008 -2011

The CGI Activities in Africa are described in the GIRAF-Project Section.

CGI in Europe

Europe - 2008

The INSPIRE Directive, adopted in 2007, is now a strong driver for pushing the adoption of interoperability in environmental information in Europe. The current process is the transposition phase (transformation into national law in every member state), and the preparation of implementing rules that will define the detailed specifications are currently prepared by drafting teams. Four members of CGI take an active role in the drafting teams (and chair one of them), thus ensuring to GeoSciML and the testbeds developed by the IWG a place of key references.



EuroGeoSurveys (EGS), the association of European Geological Survey is a strong advocate of GeoSciML and promotes its adoption in all the European-scale projects supported by EGS, as well as its extension to other related geoscientific domains.

The CGI members of France, Italy, UK, Sweden have provided a strong contribution to the realization of the GeoSciML testbed presented in Oslo, where BGS and BRGM have provided a GeoSciML interface with their modeling packages to illustrate the use of GeoSciML in 3D modeling workflows.

The OneGeology Europe project submitted in 2007 has been selected for funding by the Commission for a duration of two years. The kick-off meeting happened in September 2008 in Rome. It will give the opportunity to the project partners to further develop and implement GeoSciML, in line with INSPIRE implementing rules, and to provide an harmonized 1:1 million scale map of Europe.

European CGI members took part to the European INSPIRE Conference in Maribor (Slovenia) where GeoSciML and OneGeology were presented. Regular meetings with European Commission staff maintain a strong visibility of CGI activity which is recognized as a reference model of international thematic coordination.

Europe - 2009

The INSPIRE Directive is now entering in the implementation phase. In 2009 European experts have finalized the specifications of Annex I themes, which has clearly highlighted the importance of the communities' involvement in the process, based on representative use cases. Data specification of the geological theme will start early 2010. The geological community will be strongly involved, through experts representing EuroGeoSurveys membership, and through the presence of geoscientists in the JRC staff (Joint Research Center of the Commission, in charge of INSPIRE technical coordination). GeoSciML is confirmed as the candidate specification for supporting the geological theme.

At the same time, the OneGeology-Europe project, launched in September 2008, is regarded by the Commission, as a key testbed and demonstrator of the INSPIRE implementation. The project has identified a specific profile of GeoSciML as the project specification, ensuring a full consistency between the CGI specification and the European profile. In return, the project has made proposals to the CGI for updating the model, those proposals have been adopted. The project has also developed an important effort for the definition of vocabularies, including the translation of the vocabularies of the identified concepts in the OneGeology-Europe languages. This has also been conducted in coordination with the CGI vocabulary working group. A first implementation of web feature services

based on the GeoSciML profile has been made by 10 participating countries in October 2009. The OneGeology-Europe project will finish in September 2010.

A workshop of mineral resource scientists from France, Sweden and Finland was held in Paris in September 2009 to assess the EarthResourceML extension of GeoSciML. The workshop determined that EarthResourceML should be used for the exchange language for the African-European Georesources Observation System (AEGOS) and the European Pro-Mine initiative. EarthResourceML has been proposed as a potential INSPIRE candidate for the mineral resources theme.

Europe - 2010

2010 has been a very busy one for CGI related activities in Europe. There was the achievement of the EC funded OneGeology-Europe project in October, the CGI Science Language Workshop in Berlin and the annual meeting of the IWG in Rome.

The implementation of the INSPIRE Directive is something CGI and its Council are closely involved with. INSPIRE is defining national laws across Europe for all spatial environmental data — including geology!

The EC has selected and formed the groups responsible for the definition of the specification of the 25 themes related to environmental information. The Geology and Mineral resources themes have been merged into a single team. The Commission has selected two active members of the CGI IWG to play the leading roles of this group: Jean-Jacques Serrano as the Facilitator and John Laxton as the Editor. The group also contains other European experts active in CGI.

The specifications which will be produced by this group will define in details and standards for geological and mineral resources information and the way to exchange it. This will then become part of the European regulation and will force the public bodies that detain such information to make it available according to the INSPIRE specifications. This is obviously a huge opportunity for the CGI standards to be adopted by Europe. A first draft of specifications is being prepared and will be released in Spring 2011. It will be reviewed by the CGI.

As a result of its preliminary works, this group has proposed using the CGI standards GeoSciML and ERML as the reference for the data exchange for the INSPIRE related themes. The need to maintain a full consistency between the global standards defined by the CGI and the European standards is a clear objective of the working group.

Europe - 2011

In Europe, following the successful conclusion of the OneGeology-Europe project that has adopted and implemented the GeoSciML standard (data model and vocabularies), EuroGeoSurveys (the Association of European Geological Surveys), together with the National Geological Surveys, have committed themselves to maintain the OneGeology-Europe infrastructure. Furthermore, the Directors of the national surveys have decided to build and develop the European Geological Database Infrastructure, extending the OneGeology-Europe foundation. The Member States that were not involved in the OneGeology-Europe project will be included in the infrastructure and their experts will be trained to the implementation of GeoSciML standards, in order to setup the appropriate services on their national geological maps.

Promine, the European funded research flagship project about mining has contributed to the ERML development and its adaption to European requirements. ERML will be used to model and distribute the information about mineral resources through the Promine project and the OneGeology-Europe portal. Regarding the development of the INSPIRE European regulation, the Thematic Working Groups setup by the European Commission for the geology and mineral resources themes have

proposed basing the INSPIRE data specifications upon GeoSciML and ERML. This proposal has been submitted for review through an extended consultation process involving the major stakeholders. The final proposition taking into account the comments will be prepared for March 2012.

The AEGOS project, a European funded project to develop an African-European Georesources Observation System has proposed to adopt GeoSciML as the standard for exchanging geological information. One of the major achievements in Europe have been the inclusion of IUGS/CGI standards in the draft INSPIRE specifications for geology and mineral resources. The likely adoption of those specifications in 2012 will obviously trigger their implementation by GIS software providers that would largely facilitate their dissemination.

Main Problems Encountered in Europe

The INSPIRE working groups have mobilized most of the European experts of GeoSciML. As a consequence their contribution to global testbeds within CGI has been reduced. After the end of the OneGeology-Europe project, the funding of this activity has been fully supported by the national geological surveys but there is period of strong tension on all the national budgets.

CGI in North America

North America - 2008

In North America, significant progress was made in geoscience standards development and provision of regional and national databases, in coordination with similar initiatives in other regions. CGI's influence on these activities, in particular by facilitating communication and supporting standards development, was noteworthy. The Geological Survey of Canada (GSC) and U.S. Geological Survey (USGS) strongly endorse the CGI's mission, and invest significant resources in CGI Council and Working Groups.

Through the CGI Interoperability Working Group, North American scientists continued to help refine the GeoSciML data-exchange format standard by: 1) supporting the GeoSciML Testbed 3 effort through development of mediator technology and testing in national-scale map database systems; 2) establishing various science terminology lists and definitions for use in GeoSciML; and 3) extending the GeoSciML schema to aquifer data. GSC and USGS anticipate this new standard will greatly improve management and interoperability of their databases. For example, the GSC recently received C\$ 100,000,000 in funding over 5 years to improve knowledge of the Canadian Arctic; geological data collected through this new program will be managed in a new data system that will utilize GeoSciML for data exchange. Further, the U.S. NSF-funded "Geoinformatics Network" received 3-year funding to design fundamentals of a U.S. infrastructure for the state and federal geological surveys that will rely on GeoSciML for data exchange.

CGI-related standards development work was discussed and summarized at the twelfth annual international technical workshop "Digital Mapping Techniques '08", held in Moscow, Idaho; in particular, progress reports on science vocabularies standards and on comprehensive technical and science standards for geologic maps, and collaboration with ESRI to implement the U.S. Federal cartographic standard for geologic maps. Database projects in North America, in collaboration with CGI, also invested significant effort with ESRI to design an Arc Geodatabase template for geologic maps that will both facilitate creation and production of map databases in ESRI software, and import/export GeoSciML-encoded map data.

North America - 2009

The Geological Survey of Canada (GSC), the US Geological Survey (USGS), and the US National Science Foundation's new project "US Geoinformatics Network" (GIN) strongly endorse the CGI's mission, and invest significant resources in CGI Working Groups.

Through the CGI Interoperability Working Group, North American scientists continued to help refine the physical design, infrastructure requirements, and the various science terminology lists and definitions for the emerging standard for geoscience data exchange, GeoSciML. The GSC, USGS, and GIN anticipate this standard will greatly improve management and interoperability of the databases created and managed by the many geological surveys of the region.

Standards development in support of CGI initiatives was extensively discussed and summarized at the thirteenth annual international technical workshop "Digital Mapping Techniques '09", held in Morgantown, West Virginia. Of particular relevance were summaries of: (1) methods for implementing OGC Web Map Services and Catalog Services in support of ongoing development of GeoSciML and OneGeology; (2) a new, simplified database design for publication of single geologic maps ("NCGMP09"), and its compatibility with GeoSciML; (3) science vocabulary standards under development for both the U.S. National Geologic Map Database and GeoSciML; and (4) collaboration with ESRI to implement the U.S. Federal cartographic standard for geologic maps.

Additional CGI-related activities included participation in the Geoinformatics Townhall at the Geological Society of America national conference in Portland, OR. Discussions continue on implementing a series of NSF-sponsored workshops for academics. David Percy gave a 45 minute seminar on Geoinformatics for the Portland State University Geology Department in Spring 2009.

CGI in South America

South America - 2008

Since the promotion activities of the CGI in South-America, the OneGeology meeting in Brighton, and the increasing interest created around the OneGeology initiative, the countries of the region are becoming to recognize the importance of geoinformation technology and the role of technical knowledge and experience sharing among them. This tendency is much better appreciated among Argentina, Brasil, Chile and Colombia. In the OneGeology initiative, Argentina and Chile technicians and scientists are collaborating together on web mapping and digital mapping techniques.



In the same way, the technical dialogue among countries is also promoted by local international initiatives, most of them developed under the auspices of the Ibero-American Association of Geological Surveys (ASGMI). The Geological Map of South America at 1:1M, multinational projects on map harmonization and others projects like the Map of Patagonia at 1:1M (Argentina-Chile) are examples of ongoing projects. All of these improvements are creating, little by little, the conditions for the development of a consolidated regional group.

South America - 2009

This year was a very active one in South America. CGI supported a full week of geoscience information activities in Buenos Aires (Argentina) producing significant improvements in the relationships between technical groups from different SA countries.

During this week (from 29 June to 3 July) several different activities took place: The Annual CGI Meeting, the CGI Seminar, the first Geoscience Information Specialist Latin America Meeting (ASGMI Geological Surveys Meeting), and the OneGeology Operational Management Group meeting.

The CGI Seminar gave the SA technicians the opportunity to stay in contact with the latest developments in geoscience information (GI) standards, GI information policies, national and international projects, as well as to become familiar with the current state of GI developments.

The first GI Latin America Specialist Meeting was organized with the aim of creating a regional group on GI and promoting the development of a cooperation framework. Experts from Argentina, Brazil, Chile, Ecuador, Dominican Republic and Spain attended these sessions. Initially this group is looking for institutional support from ASGMI and the proposal to this organization will be sent during the next general ASGMI meeting that will be take place during 2010.



The OneGeology Operational Management Group was also held in Buenos Aires. During this meeting the current status of OneGeology development in SA was presented and the necessity of training on interoperability and geosciences was raised. A plan for three training courses

about: 1) basic interoperability, 2) GeoSciML Training Course Preparation (given by OneGeology Technical Working Group in order to prepare future trainers) and 3) GeoSciML (given by locals open to all SA) are in progress. The Spanish International Cooperation Agency will support courses 1 and 3 and, at present, course number 2 is looking for funds.

Brazil recently started publishing their geological data in GeoSciML. This is an excellent development from South America in the OneGeology initiative. Contacts with Bolivia and Peru are still difficult and we hope to renew contacts with Paraguay, Uruguay and Venezuela.

CGI Seminar Information Technology and Geosciences for Latin-America

A successful seminar on information technology and geosciences was organized by the CGI, the Geological and Mining Survey of Argentina (SEGEMAR) and the Jacobs University (Bremen, Germany) in Buenos Aires Argentina, from 30 June to 1 July.



The aim of this seminar was promote the development of geoscience information technology and science in SA with special emphasis in corporate data management, interoperability standards, institutional data policies, and the last developments and rules of geological surveys on national spatial infrastructure programs.

The seminar was attended by 184 participants from nine nations (from Latin America: Argentina, Brazil, Chile, Colombia, Ecuador and Dominican Republic; from the rest of the world: Australia, Spain and United States).

The first day main technical presentations were made by the CGI council and during the second day the regular sessions had 17 presentations mainly given by locals and also with contributions from Australia, Spain and USA.

This seminar was a good starting point for similar meetings. As a result of the success of this initiative, a new congress about land management, spatial data infrastructures and interoperability is in preparation.

South America - 2010

Current CGI activities in South America are focused on:

- Developing outreach activities to reduce the technological gap between developed and developing countries.
- Encouraging countries and organizations to have an active role in geoscience-information developments and applications in connection with hazard management systems and National Spatial Data Infrastructure projects
- Promoting the development of the OneGeology international initiative.

The CGI Seminar held in Buenos Aires in 2009 helped to create good relationships among countries and also provided context for the development of local initiatives and outreach activities. A second event was held in April 2010:

CGI Seminar Information Technology and Geosciences for Latin-America

This training course, supported by the Spain International Cooperation Agency, was developed in Cartagena, Colombia and focused on training in providing OneGeology level 1 services. Lectures were given by senior scientists from Spain, Argentina, Brazil and Peru. The success of this last event means that three new courses will be developed during 2011.



From the institutional point of view an important step was the promotion and support of OneGeology by ASGMI (Iberoamerican Geological and Mining Surveys Association) during its last meeting held in Barquisimeto, Venezuela.

Good news about the development of geoinformation systems comes from Brazil, Chile, Peru, Dominican Republic, and Cuba, where new corporate geosciences information systems were developed. Venezuela also has plans to develop their own system. OneGeology is celebrating the participation of Peru and Uruguay as new members, and the initiative now covers almost the 80% of South American continent!

South America - 2011

The CGI activities in South America are focused on the development of outreach activities to encourage the development of geoinformation and associated skills, promote the adoption of CGI standards and create awareness about the importance of information technologies in GS activities at decision-making levels. During this year three different training courses were prepared:

- Accesing and Using Geoscience Information on Internet. From GEO-RSS to WMS, and ONE GEOLOGY. Argentina Geological Congress. A training course oriented to general geoscientist.
- Electronic Geoscience Languages. Spain Cooperation Agency.
- Digital Cartography in the Context of NSDI. An Introduction to Geographic Data Modelling and ISO19103. Latin America Geological Congress.

Unfortunately due to circumstances beyond the control of the organisers the last two courses were cancelled. A new technical group on Electronic Geoscientific Languages was created. The aim of this group is the development of a consistent set of geoscientific terms in all of the Spanish speaking countries in order to guarantee the semantic interoperability of the data across the continent. During 2011 the objectives and the work plan for 2012 was defined. It's expected that during 2012 this workgroup will start with its activities.

A new regional contact was made with Cuba; this country is planning to join OneGeology in the medium term. CGI is also actively encouraging the development of geoinformation systems by technical support (mainly OneGeology) to several countries like Colombia and Ecuador. The Ibero-America Geological and Mining Survey Association produced several documents supporting One Geology, although there is not a concrete action at present. The main products in South America are related to the development of material that supports outreach activities.

These are:

- OneGeology Curricula for Latin America. A document that defines what skills have to be mastered in order to understand and use GeoSciML
- OneGeology Level One Training Course. A first course basically prepared to understand WMS and related data services.
- Geospatial Data Models. A training course preparation for understanding the importance of geospatial data models and the relationship with GeoSciML.
- A CGI cd-rom with presentations about geoscience information in SA is nearly complete.

Main Problems Encountered in South America

Despite many successful activities (CGI-Seminar 2009, Cartagena training course 2010) and the network of collaboration now created, communication between professionals from different countries is still not easy. This problem has different causes:

- 1) The geoscience information discipline is still not fully recognised as part of geological science.
- 2) Trips and travel expenses are usually allowed only for senior positions in organisations.

The difficulties in communication and meeting organization make it also more difficult to maintain group cohesion and stay informed about the problems and issues that each of SA countries have. In this context, outreach activities have to be organized based on immediate opportunities when support and funding appear, rather than a clear medium term strategy.

CGI in Oceania

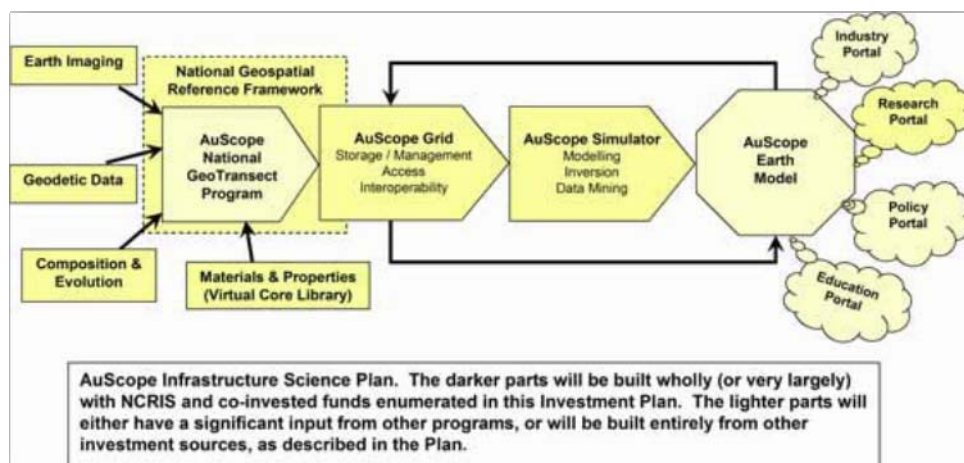
Oceania - 2008

Through the Australasian Government Geologists Information Committee (GGIC) and AuScope, Australia has actively participated in the CGI Interoperability Working Group activities to produce the geological map information model, GeoSciML. The GGIC has extended GeoSciML into the mineral occurrences domain and is currently working on extending it to the geochronology and geochemistry domains.



The Australian AuScope initiative aims to establish a research infrastructure to map the structure and evolution of the Australian continent. The development of computers and the increasing capacity of those computers has had a fundamental impact on how scientific research is undertaken in Australian earth sciences. Computation has now joined theory and experiment as a third mode of scientific enquiry, whilst exponential changes in transistor capacity, storage density and network performance are rapidly changing the face of earth sciences. Access and interoperability are crucial components for this research that is increasingly done through distributed global collaborations across the Internet. AuScope Grid aims to provide the connective fabric and enabling technologies that will allow a dynamic community of practice to operate within this global framework.

The CGI development and testing of the geoscience information models has identified a gap between the models and the supporting technologies. A key component of the AuScope Grid program aims to close this gap by developing the required Web Feature Service software and supporting information



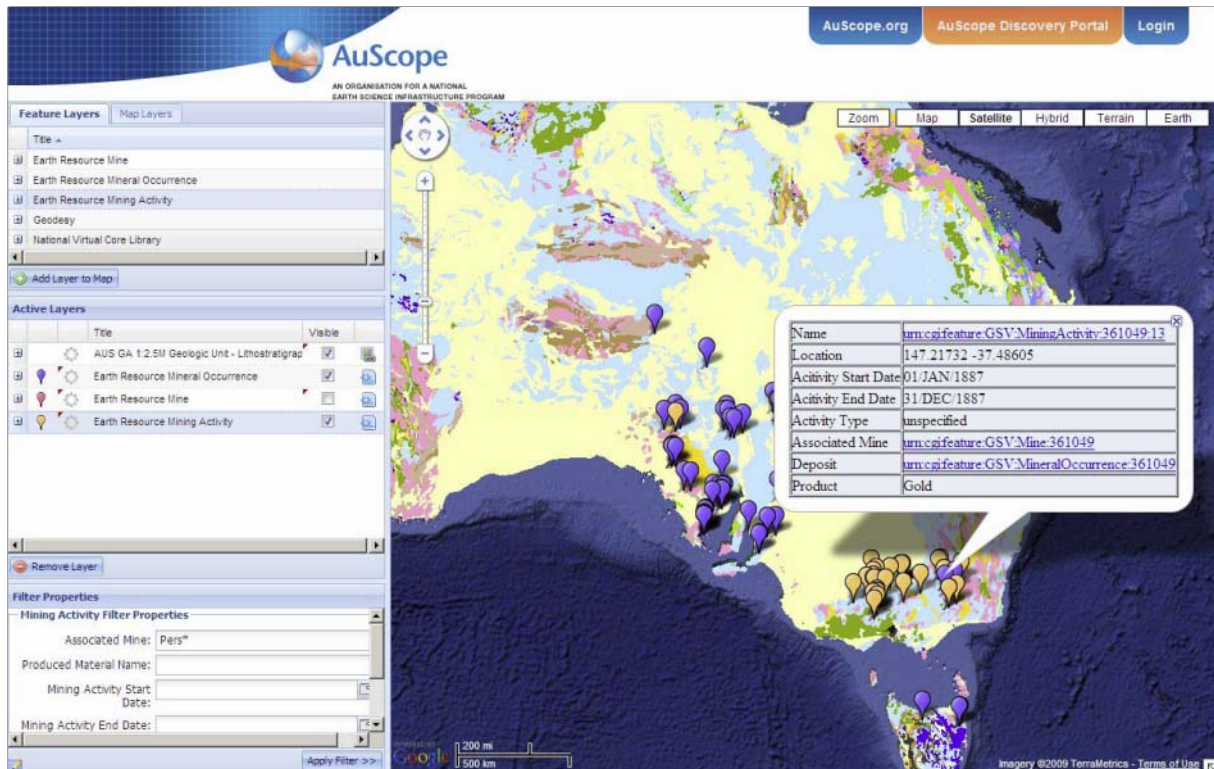
modelling tools.

Oceania - 2009

The AuScope Community Earth Model is building an e-Research Infrastructure as part of the Australian Government National Collaborative Research Infrastructure Strategy to federate nationally distributed data sets, to develop tools to manipulate large data volumes and to establish an appropriate governance framework to ensure sustainability. This Community Earth Model will use open geospatial standards to allow real time access to data, information and knowledge stored in distributed repositories. It is being built on 'end-to-end' science principles whereby there will be

access to the highly processed information and knowledge as well as the original raw data and the processing programs used to generate the results.

AuScope is working closely with the CGI-IUGS sponsored GeoSciML community to develop open source tools to generate community schema (FullMoon), modify the service middleware required to deliver complex geological data (GeoServer) and develop vocabulary services and software to support data content standards. To further the CGI-IUGS work, the TWiki discussion and email list services required to progress the GeoSciML development, as well as the various versions of the schema are all hosted and maintained by AuScope.



Web feature services have been established using the AuScope Community Earth Model software that deliver the mineral occurrence data from (currently) three State geological surveys in a common EarthResourceML format. The AuScope Discovery portal (<http://portal.auscope.org/gmap.html>) allows querying and displaying these web feature services, as well as display and query of simple web feature services and web mapping services. All the software has been developed in-line with open source aims.

Oceania - 2010

AuScope continues to be the main geosciences information related activity occurring in Australia; it is one with significant benefits for global information applications. The AuScope Discovery Portal allows users to discover, browse, save, and process geospatial information from earth science data sources around Australia. These sources include drillhole hyperspectral, geology and mineral resource data based on GeoSciML, EarthResourceML and O&M services. Both the GeoSciML and EarthResourceML exchange languages are governed by CGI.

Government Geologists Information Committee (GGIC) Activities

Close working between the CGI and the GGIC continued in 2010. The GGIC is a committee of geosciences information managers from the Australian State/ Territory/Federal geological surveys and the New Zealand Ministry of Economic Development and GNS Science agencies. It reports

directly to the Australian/New Zealand Chief Government Geologists Committee (CGGC). Its mission is to provide and promote a coherent national strategic direction for the management and delivery of geoscience information on behalf of CGGC. As part of this mission, CGGC finances Oceania representation at CGI Council meetings.

The CGGC requested the CGI assume ongoing governance and development of the GGIC developed EarthResourceML. This was agreed to at the 2010 CGI Council meeting. EarthResourceML has also been proposed as a candidate information model for the European INSPIRE Mineral Resource exchange model.

Pacific Islands Applied Geoscience Commission (SOPAC)

Initial contact with SOPAC has been made by CGI. Although the CGI Oceania representative (Bruce Simons) was unable to attend the SOPAC 39th Annual Session held in Fiji on 16–22 October 2010 at short notice, it is hoped that further collaboration between CGI and SOPAC will occur during 2011.

Oceania - 2011

For the Oceania region, the year has mostly been about improving and hardening the software required for interoperability, and establishing OGC Web Feature Services. As part of the Spatial Information Services Stack (SISS) the main software development has concentrated on:

- improving performance of middleware to deliver and filter application schema, such as GeoSciML and EarthResourceML, and making it GML 3.2 compliant;
- improving Sesame to allow SPARQL queries to a vocabulary service;
- developing FullMoon to generate application schema from UML models;
- developed an OpenSource portal to access Web Feature Services.

The Spatial Information Services Stack (SISS) project is a collaboration across multiple open source projects to provide a complete suite of tools that allow for spatial data interoperability. SISS has been deployed to numerous geoscience and research organisations to deliver mineral resource, groundwater, hyperspectral, geochemistry, geothermal and surface water reservoir data. A three-day workshop was held in March 2011 to demonstrate how communities can use SISS to provide interoperable data services. Over 150 people from more than 50 organisations (government agencies and departments, research organisations, industry and university) attended the workshop.

AuScope has assisted seven geological surveys from Australia and New Zealand, along with CSIRO and the University of Ballarat to establish a variety of Web Feature Services using GeoSciML, EarthResourceML, GroundWaterML and the OGC Observations & Measurements exchange languages. These services can all be queried and the results displayed in the AuScope Discovery Portal.

Relationships between the Australian and New Zealand geological survey information groups remain strong, as a result of CGI and Government Geologist Information Committee (GGIC) activities.

AuScope released version 2.8 of the AuScope Discovery Portal in early 2011, allowing users to discover, browse, save, and process geospatial information from earth science data sources around Australia. The AuScope Extension project will ensure the continuation of the AuScope Discovery Portal and infrastructure deployed at the Australian geological surveys until 2013. The Australian State/NT geological surveys have established independent data services that are providing geology, mineral resource and down-hole hyperspectral, data, based on CGI's GeoSciML and EarthResourceML data exchange standards.

The University of Ballarat (UB) and the Victorian Department of Primary Industries Future Farming Systems Research (DPI-FFSR) established groundwater Web Feature Services delivering Borehole and MappedInterval (GeoSciML) and WaterWell (GroundWaterML) features.

The CSIRO Minerals DownUnder Flagship has established the following OGC Web Feature Services using GeoSciML and O&M:

- PressureDB geothermal borehole services to deliver well information, temperature, salinity and pressure;
- Laterite (regolith) specimens (AlterationUnits) and geochemistry;
- National Virtual Core Library boreholes and downhole hyperspectral data.

GNS Science (New Zealand) have established 1:250k South Victoria Land, Antarctica geology web mapping services and are currently establishing New Zealand 1:250k geological map services for OneGeology.

Main Problems Encountered in Oceania

The Government Geologists Information Committee (GGIC) is a committee of geoscience information managers from the Australian State/Territory/Federal geological surveys and the New Zealand Ministry of Economic Development and GNS Science agencies. It reports directly to the Australian/New Zealand Chief Government Geologists Committee (CGGC). Its mission is to provide and promote a coherent national strategic direction for the management and delivery of geoscience information on behalf of CGGC. GGIC is currently in a state of flux. Many of the State geological surveys are being re-organised (for example GeoScience Victoria has been disbanded) and the respective information sections are under funding pressures. The Ministerial Councils the CGGC answer to are being re-organised. CGI made initial contact with SOPAC (Pacific Islands Applied Geoscience Commission) in late 2010. At the time SOPAC was going through significant changes, but their initial reaction was that "it would fully support close ties between SOPAC (on behalf of its island members) and (IUGS-CGI)". This has not progressed.

CGI Global

CGI, its Working groups and members deliver GeoSciML, which is the "interoperability engine" that powers OneGeology. OneGeology is a project tightly linked to CGI; it made progress on several fronts in 2011: 117 nations are now participating, data services are increasing in number and sophistication, an accreditation scheme was launched, and critical governance issues (incorporation) were taken forward by the Steering Group which met in Tokyo in September. CGI also contributes significantly to ICSU CoData progress and to developments in Open Geospatial Consortium standards. OneGeology and CODATA are summarised below.

Main Global Problems Encountered

It is important to mention here that an overarching problem for CGI is the issue of lack of IUGS funding for travel and thus reliance on national budgets that are under increasing pressure. This has limited CGI progress. It is a problem that is being exacerbated because national priorities are seemingly increasingly domestic. Finally, we should report that progress with the Multilingual Thesaurus has not been as planned because of a difficult mix of different views on strategies and political and personal issues within the groups and individuals involved. CGI Council has resolved this by rationalising the working groups involved and we hope the MLT now has clear leadership and goals.

CGI at the 34th IGC in Brisbane

The CGI, in conjunction with the IAMG and GIC, are jointly organising a Geoscience Information Super-symposium at the 2012 34th IGC. The geoinformation sessions are about data and information



management and services, including informatics standardization.

This super-symposium is consisting of six major themes encompassing:

- spatial data infrastructure and regional geoinformation initiatives;
- interoperability and standards;
- delivery, dissemination and exploitation of geoscience data and information;
- mathematical geology and geostatistics;
- model fusion, visualisation, exploration and 3D & 4D modelling;
- software, hardware, open source and super computers.

In addition, there will be a 'Hot Topic' plenary session, scheduled for 1–2pm on one of the days, providing presentation and discussion on the 'Geoscience Information Revolution'.

As the Congress is only 5 days (6–10 August, 2012), fitting the proposed sessions into the available time will be a challenge. The organisers are therefore keen to ensure the highest quality for oral presentations and will be emphasising the importance of poster presentations.

The Geoscience Information Supersymposia coordinators are Bruce Simons (CGI), Simon Cox (CSIRO, Ex-CGI Council), Robert Tomas (EC) and Richard Hughes (BGS).

Prior to the Congress the Sustainable Mining Workshop in Africa workshop is being organized by and funded by the Australian Government's AusAID agency. Here the CGI is represented through Kristine Asch (BGR) who is leasing a session on GeoScience Information in Africa.

The CGI Council will meet just after the IGC for the last time in its momentary composition and welcome and introduce the new Council members.



7. FINANCE & BUDGET

	\$ account		€ account	
	in	out	in	out
Balance 2007	27.160,98		2.429,17	
2.008				
Travel expenses preparation Giraf Schutte				-240,00
cost CGI bank account 2008				-30,00
cost transfer accounts Fortis--> LCL				-43,26
Balance 2008	27.160,98		2.115,91	
2.009				
ACCOUNTS TRANSFERED				
Travel expenses Broome CODATA		-1139,69		
Repro banner Giraf				-216,91
2009 IUGS allocation	15.000,00			
cost transfer IUGS --> CGI		-23,01		
Travel expenses S. Richard - MLT St Petersburg		-2808,85		
transfer charges		-24,60		
2.010				
Payment maintenance of CGI web site (NERC/BGS)		-2300,00		
2010 IUGS allocation	7.500,00			
transfer charges		-23,17		
transfer charges		-21,16		
2.011				
transfer charges				
2011 IUGS allocation	10000,00			
transfer charges		-23,54		
Payment maintenance of CGI web site (NERC/BGS) 1549.87£				-1779,01
transfer charges				-30,00
transfer charges				-22,00
transfer account USD --> €		-1900,00	1377,81	
transfer account USD --> €		-		
transfer account USD --> €		19000,00	13777,10	
transfer charges				-25,90
Payment to BGS - Giraf workshop				-13783,00
transfer account USD --> €		-8900	6610,71	
transfer charges				-22
Payment to BGS (update cookbooks, schematron rules)				-6600

Balance December 2011	23.496,96	1.402,71
	\$ account	€account

8. WORK PLAN FOR THE YEAR 2012

The major aims for 2012 are:

- Continue GeoSciML and Earth Resource ML development, ensuring consistency between INSPIRE data specifications, or other regional developments and CGI standards.
- Formalise the relationship between IUGS and OGC, with the objective of making GeoSciML an OGC standard.
- Make the ISC stratigraphic chart web accessible.
- Prepare the participation of CGI in a geoinformation meeting in South America.
- Hold the postponed Asian CGI outreach workshop in mid-February in Thailand.
- Prepare for the Geoinformation supersession at the IGC2012
- Manage the CGI election and provide a sound base for the continuation of the CGI activities after the change of the Council.

Planned publications in Episodes or through the IUGS website

The CGI is planning to publish articles about their work on GeoSciML and GIRAF and a paper on "the challenges and issues of geo-information training in Latin America "

Planned participation in the next IGC

In this era of data-intensive scientific discovery – the so-called ‘Fourth Paradigm’ – the significance of interoperable data, information, systems and infrastructures is paramount in advancing the entire geoscience discipline and responding to the great societal challenges. The CGI, along with the IAMG and GIC is organising this major theme in a Geoscience Information Super-Symposium at the 34th IGC. It aims to build on the successes of the 33rd IGC by attracting leading speakers from across the globe to present ‘the state of the science’ and to stimulate discussion on the major challenges ahead that must be addressed in order to move the field of geoscience information to the next level.

The theme encompasses spatial data infrastructure and regional geoinformation initiatives; interoperability and standards; delivery, dissemination and exploitation of geoscience data and information; mathematical geology and geostatistics; model fusion, visualisation, exploration and 3D & 4-D modelling; tools – software, hardware, open source and super computers.

9. CRITICAL MILESTONES

The most important critical milestone for CGI by far will be the installation of a new Council and officers at the IGC in August 2012.

Review of CGI by the IUGS

The review took place on 24 and 25 September 2009, at the German Geological Survey (BGR), Hannover, Germany. Attending the review were:

Ad hoc Review Committee members:

- Peter Bobrowsky - IUGS Secretary-General (ARC Chair)
- Colin Simpson - IUGS Councillor (ARC Secretary)

2008-2012

- Jonas Satkunas - Deputy Director –Lithuanian Geological Survey
- Brian Marker (Independent Consultant)

CGI Council Member Participants

- Kristine Asch (CGI Chairperson) - Germany
- Ian Jackson (CGI Secretary General) – United Kingdom

In addition to a full dialogue between review participants a full suite of documents and presentations were reviewed. In summary the review concluded that CGI was performing well and was a very successful Commission, especially in the areas of standards and outreach (eg GeoSciML, GIRAF and OneGeology). There were a few areas which would merit further attention, including opening up areas of the website, increasing effort on the MLT, interacting with the IUGG and spearheading a multi-union proposal to ICSU.

10. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (2007-2011)

CGI developed an Action Plan in 2008 which is set out in section 1 of this report. Evidence indicates that, despite issues of resources and travel constraints, CGI through its Working Groups, members and associated initiatives, has been extremely successful. The Commission has: catalysed alliances, vide 1G, 1G-E, GIC, ICSU, IAMG, INSPIRE, GGIPAC, AUSCOPE, ICS, CGMW, EGS, OGC; stimulated progress and standard geological concepts, vide CDTG, MTG, 1G-E multilingual vocabulary; promoted the use of data exchange standards, vide IWG, 1G, 1G-E; facilitate outreach, vide GIRAF, S. American workshop, 1G; Played a full role in the coordination of regional initiatives, vide INSPIRE, 1G-E, CCOP .

11. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2012-2017)

Given the substantial changes in the composition of CGI Council and officers in August 2012 final decisions on the next 5 year aims and strategy will not be made until the new Council is in post. However, the provisional goals are:

- Catalyze productive alliances between geo-information bodies, including OGC;
- Stimulate progress in development and application of standard geoscience concepts and their representation in multiple languages;
- Promote international use of data exchange standards;
- Facilitate outreach, knowledge transfer and take-up of best practice in geo-information (e.g. with the South America initiative, the Asia initiative and GIRAF)
- Enhance collaboration with other IUGS commissions, e.g. ICS
- Play a role in coordination of regional initiatives, e.g. by organizing geoscience information, standard and language Workshops,
- and short and longterm organize geoinformation super-symposiums at the IGC 2012 and 2015 (Melbourne and Capetown)

12. SUGGESTIONS FOR IMPROVEMENT OF IUGS ACTIVITIES, ESPECIALLY IN REFERENCE TO ACTIVITIES OF IUGS BODIES

Understandably, given the remit of our Commission, we would urge the IUGS Executive to give greater prominence in terms of discussion time, publication space and funding, to the area of geoscience information and especially digital standards. In a world which is increasingly data and IT driven and dependent, it is imperative that the IUGS takes a lead in pushing forward digital advances and ensuring consistency of approach in geoscience data content and applications. Without this, holistic solutions to transnational geological challenges will be that much more difficult to deliver. We believe there is a need for geoscience information expertise to be present at the highest level in IUGS, ie a member of the Executive; if necessary by co-option.

Acknowledgements

We would like to record our thanks to all members of the CGI Council, the CGI working and task groups and secretariat, and to members of the IUGS Executive for their help and encouragement over the last four years.

8 June 2012



List of Council Members 2008–2012

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